

The Remler ambulatory blood pressure recording system

Accuracy and reliability

Sir,

A recent letter to the editor of the *British Heart Journal* by Beevers and his co-workers presents data concerning the accuracy and reliability of the Remler ambulatory blood pressure recording system.¹ We would like to summarise our extensive experience with the Remler equipment² and to conjecture about possible causes for the distinct differences in our findings.

We should first point out that the letter by Beevers *et al.* deals with a more recently marketed system than the one we have tested. The two systems are, however, identical with respect to the critical components and the fundamental method of measurement.

The data presented by Beevers *et al.* suggest that the Remler system yields higher pressures than comparison instruments. Using a simple method of making simultaneous, ipsilateral measurements (a y-shaped tube connecting the arm cuff with a conventional mercury sphygmomanometer and the recorder), we collected data for a single pressure cycle in each of 100 consecutive hypertensive patients. Combining systolic and diastolic (phase V) measurements, we found agreement within 2 mmHg in 99.5 per cent of the 200 pairs of observations and identical values in 84 per cent (Table). Our mean differences (recorder minus sphygmomanometer) were 0.1 and 0.2 mmHg for

systolic and diastolic pressure, respectively, as opposed to the corresponding differences of 7.4 and 10.4 mmHg found by Beevers *et al.*, using the same technique with a London School of Hygiene sphygmomanometer.

Assuming that we are correct in our assertion that the minor differences between our recorders and those used by Beevers *et al.* could not account for the major differences in our findings with respect to the accuracy of the Remler system, we can only raise some questions about the possibility that Beevers's laboratory was using an incorrect decoding technique and/or defective equipment. Both these conjectures seem plausible in the light of statements by Beevers *et al.* that only 50 per cent of their home blood pressure readings "could be interpreted from the print-outs" and that the "most frequent reason for inability to obtain readings resulted from calibration artefacts obscuring the pulse beats . . ."

The "ability to obtain readings" does not principally depend on the legibility of the ink-pen record. Accurate measurements with the Remler system primarily require careful aural tape-monitoring and can be readily achieved without optimal chart recordings. One of the major strengths of the Remler design is that it does not electronically "interpret" Korotkoff sounds or arterial movements. Instead, it provides a direct analogue to the conventional auscultatory method, thereby making possible the close agreement we have found between the two sources of measurements.

"Calibration artefacts" in Remler recordings are usually attributable to drained batteries, a broken cable, or a dirty transducer assembly. If the recorder is routinely maintained and tested before each ambulatory study, the failure rate can be kept within an acceptable range. Our own laboratory has processed more than 50 000 hours of blood pressure recordings made with Remler equipment; we estimate that we successfully measure 90 to 95 per cent of the readings. Certainly, any recorder in our laboratory that showed a 50 per cent failure rate, even on a single occasion, would immediately

Table Frequency distribution of absolute differences between simultaneous blood pressure measurements by Remler M-109 recorder and conventional mercury sphygmomanometer: one systolic-diastolic (phase V) pair in each of 100 consecutive hypertensive patients

Difference (mmHg)	Systolic	Diastolic	Combined	Combined per cent
0	85	83	168	84.0
2	15	16	31	15.5
4	0	1	1	0.5
Total	100	100	200	100.0

be checked to identify the cause of the malfunction.

Ronald Cowan,
Maurice Sokolow,
Dorothee Perloff,
Computer Center,
Department of Medicine, and
Cardiovascular Research Institute,
University of California,
San Francisco, California 94143,
USA.

References

- ¹Beevers DG, Bloxham CA, Backhouse CI, Lim CC, Watson RDS. The Remler M2000 semi-automatic blood pressure recorder (letter). *Br Heart J* 1979; **42**: 366.
- ²Cowan RM, Sokolow M, Perloff D. Methodological considerations in determining the accuracy of an indirect blood pressure recorder. Proceedings, Third International Symposium on Ambulatory Monitoring, London: 27-30 June 1979. (In press.)